

ABSTRACT OF THE DISCLOSURE

A composite metal object comprises ductile crystalline metal particles in an amorphous metal matrix. An alloy is heated above its liquidus temperature. Upon cooling from the high temperature melt, the alloy chemically partitions, forming dendrites in the melt. Upon cooling the remaining liquid below the glass transition temperature it freezes to the amorphous state, producing a two-phase microstructure containing crystalline particles in an amorphous metal matrix. The ductile metal particles have a size in the range of from 0.1 to 15 micrometers and spacing in the range of from 0.1 to 20 micrometers. Preferably, the particle size is in the range of from 0.5 to 8 micrometers and spacing is in the range of from 1 to 10 micrometers. The volume proportion of particles is in the range of from 5 to 50% and preferably 15 to 35%. Differential cooling can produce oriented dendrites of ductile metal phase in an amorphous matrix. Examples are given in the Zr-Ti-Cu-Ni-Be alloy bulk glass forming system with added niobium.

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